



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/818,324	03/26/2001	Nancy E. Iwamoto	30-5009 (4960)	1114

7590 07/02/2004

Sanda P. Thompson
Riordan & McKinzie
Plaza Tower
600 Anton Blvd., 18th Floor
Costa Mesa, CA 92626-1924

EXAMINER

MAYES, MELVIN C

ART UNIT

PAPER NUMBER

1734

DATE MAILED: 07/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/818,324		IWAMOTO ET AL.	
	Examiner		Art Unit	
	Melvin Curtis Mayes		1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-15 and 22-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-15, 22-28 is/are rejected.
- 7) ☒ Claim(s) 29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

(1)

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 1, 2004 has been entered.

Claim Rejections - 35 USC § 103

(2)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(3)

Claims 13-15 and 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung 6,399,178 in view of Calhoun et al. 5,275,856 and Wasulko 5,049,434.

Chung discloses a method for bonding an electronic device to an electronic substrate comprising: providing a B-staged underfill preform; tacking the underfill preform to the electronic substrate; laminating the device to the electronic substrate via the underfill preform; and heating to cure the underfill preform. The underfill preform comprises a thermoplastic-based or thermosetting-based polymer adhesive which is strong and flexible when dried or B-staged to facilitate handling and laminating to a device or substrate but is rigid after curing. The adhesive

is loaded with filler such as alumina to reduce the coefficient of thermal expansion and to enhance thermal conductivity. Chung discloses that the adhesive underfill preform can be made to include conductive solder bumps in the same pattern, pitch and position as that of the contact pads of the substrate to which the underfill preform will interconnect by providing the underfill preform with a pattern of holes which are filled with columns of solder paste or solder cream (col. 7 – col. 23, specifically col. 14 – col. 16). Chung discloses forming the underfill preform on a Teflon release liner (Example 4) and discloses forming the holes in the adhesive for the solder paste by die cutting or photo-etching (col. 23, lines 16-34) but does not disclose providing the preform on a sacrificial assembly of sacrificial layer and release coating and removing the sacrificial assembly after applying the preform to the substrate or disclose forming the holes by lasing or drilling.

Calhoun et al. teach that in making an adhesive web for interconnecting two electrical devices via conductive material in areas corresponding to the electrodes to be interconnected, the adhesive is provided as part of a tape comprising a flexible carrier web that has a low adhesion face, such as papers having polymeric coatings, onto which the adhesive layer is provided. The adhesive layer is separated from the carrier web to bond the two electrical devices. Calhoun et al. further teach that the perforations in the adhesive for the conductive material can be formed by punching or laser drilling and teach that the adhesive web can include not only fillers but also other useful materials such as woven and nonwoven fabrics (col. 2, lines 10-68, col. 5, lines 31-37 and 54-59).

Wasulko teaches that adhesive for attachment of electrical devices to a device substrate is provided as an adhesive transfer system having a carrier film which releasably holds the

adhesive. In use, the carrier film is superimposed over the device substrate for transfer of the adhesive and stripped from the adhesive when it is desired to assemble the device on the adhesive. Wasulko teaches that representative support (carrier) films include paper and thermoplastic polymers such as polyester resins coated with a suitable release layer such as silicone and fluorocarbon compositions. Wasulko teaches that when the adhesive is transferred to the substrate, the support film functions as a protective release film over the adhesive until stripped for bonding of the device to the substrate (col. 2, lines 35-68, col. 4, lines 1-29, col. 5, lines 23-35).

It would have been obvious to one of ordinary skill in the art to have modified the method of Chung for bonding an electronic device to an electronic substrate by providing the B-staged underfill preform on a release liner carrier web for transfer to the substrate for bonding an electronic device such as an IC, as Calhoun et al. teach that an adhesive web for interconnecting two electrical devices is provided as part of a tape comprising a flexible carrier web that has a low adhesion face onto which the adhesive layer is provided and as Wasulko teaches that adhesive for attachment of electrical devices to a device substrate is provided as an adhesive transfer system having a carrier film which releasably holds the adhesive and that is not stripped from the adhesive until it is desired to assemble a device on the transferred adhesive. Providing the underfill preform on a releasable carrier film with release layer, such as a polyester film with a release layer of silicone or fluorocarbon, as claimed in Claims 22 and 28, would have been obvious to one of ordinary skill in the art to provide the adhesive preform with a carrier film which functions as a protective release film over the adhesive until it is desired to assemble the device on the adhesive on the substrate, as taught by Wasulko.

Providing the holes in the underfill preform to be filled with the solder paste by lasing, as claimed in Claim 15, would have been obvious to one of ordinary skill in the art, as Calhoun et al. teach that the perforations in the adhesive for the conductive material can be formed by punching or laser drilling.

Providing the underfill preform with a fine mesh fiber that is thermally conductive and electrically non-conductive, as claimed in Claims 23 and 24, would have been obvious to one of ordinary skill in the art, as Calhoun et al. teach that the adhesive web can include not only fillers but also other useful materials such as woven and nonwoven fabrics. Providing a fabric that is thermally conductive and electrically non-conductive in addition to filler such as alumina to reduce the coefficient of thermal expansion and to enhance thermal conductivity would have been obvious to one of ordinary skill in the art to further enhance the thermal conductivity or reinforce the adhesive underfill preform.

Allowable Subject Matter

(4)

Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

(5)

Applicant's arguments filed June 1, 2004 have been fully considered but they are not persuasive.

Applicant argues that the adhesive underfill of Chung is not a preform that comprises a base layer of thermosetting or thermoplastic material and wire or solder paste through conductors and does not have a sacrificial assembly of sacrificial layer with release coating. Applicant argues that the conductive adhesive tape of Calhoun et al. are not sacrificial assemblies with sacrificial layer and release coating and argues that the teaching of Wasulko does not apply to Chung and/or Calhoun.

(6)

Chung discloses a method of using a dried (thermoplastic) or B-staged (thermosetting) preform for bonding an electronic device to an electronic substrate by tacking the preform to the electronic substrate, laminating the device to the electronic substrate via the preform and heating to cure the preform. The preform comprises a thermoplastic-based or thermosetting-based polymer adhesive which includes conductive solder bumps provided by forming holes in the adhesive and filling the holes with columns of solder paste or solder cream, the same as the claimed base layer of thermosetting or thermoplastic material and solder paste through conductors. While Chung discloses forming the underfill preform on a Teflon release liner, the reference does not disclose providing the preform on a sacrificial assembly of sacrificial layer and release coating and removing the sacrificial assembly after applying the preform to the substrate.

Calhoun et al. and Wasulko are pertinent to the method of Chung because the references teach that adhesive underfill preforms are applied to a substrate by transfer from a support film. As taught by Wasulko, clear motivation for providing the preform on a support film is that the support film can also function as a protective release film over the adhesive preform until it is stripped for bonding the device to the substrate. As also taught by Wasulko, support films can be a film such as polyester with a release coating such as silicone or fluorocarbon. The Examiner maintains the position that it would have been obvious to one of ordinary skill in the art to have modified the method of Chung by providing the preform on a support film of film and release coating, as suggested by Calhoun et al. and Wasulko, as used to support an underfill adhesive preform for transfer and to also function as a protective release film over the adhesive preform until it is stripped.

Conclusion

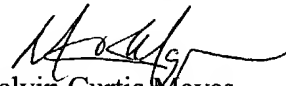
(7)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1734

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
June 30, 2004